2nd Semester FINALS Review!

4.4, 4.5, 4.7 (Trig Graphs, Inverse Trig)
Chapter 5 (Trig Identities, Solving Trig Equations)

Ch. 4 Part 1

1. Find sec and tan if …

$$\cos\theta = -\frac{2}{5} \text{ and } \sin > 0$$

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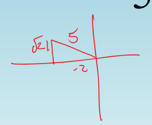

$\boxed{\frac{\sqrt{21}}{-2}}$
Tan

$\boxed{-\frac{5}{2}}$
sec

2. Solve the triangle.

$$A = 60°, B = 84°, c = 12$$

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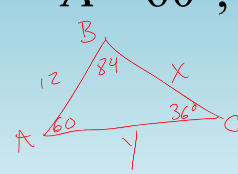
ASA

$$A = 60°, B = 84°, c = 12$$



$\frac{12}{\sin 36} = \frac{x}{\sin 60}$ $\boxed{x \approx 17.68}$

$\frac{12}{\sin 36} = \frac{y}{\sin 84}$ $\boxed{y \approx 20.31}$

3. Solve the triangle.

$$C = 40°, a = 30, b = 30$$

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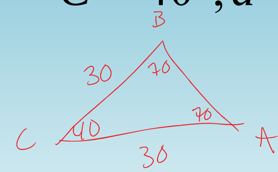

$$\frac{30}{\sin 70} = \frac{x}{\sin 40}$$

$$\boxed{x \approx 20.52}$$

4. Find the area of the triangle.

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Ch. 4 Part 2

1. Graph two periods.

$$y = 10\cos\left(2\theta - \frac{3\pi}{4}\right) - 3$$

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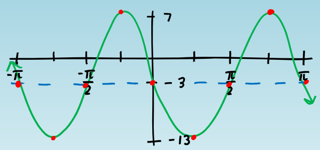
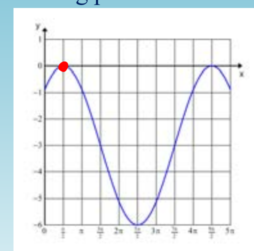
$P = \frac{2\pi}{2} = \pi$



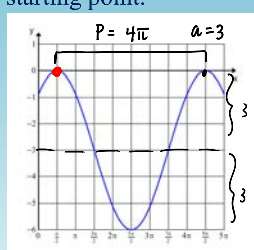
2. Write an equation of the graph below using the red dot as a starting point.



2. Write an equation of the graph below using the red dot as a starting point.

$4\pi = \frac{2\pi}{b}$

$b = \frac{1}{2}$



$\rightarrow \frac{\pi}{2}$ $\downarrow 3$

$\boxed{y = 3\cos\left(\frac{1}{2}x - \frac{\pi}{2}\right) - 3}$

3. Write an equation of the following:

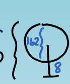
A Ferris wheel has a maximum height of 170 feet. The radius of the wheel is 81 feet. One rotation of the wheel takes 90 seconds, and the riders get on at the bottom of the wheel.

When is the first time the rider reaches 145 feet?

3. Write an equation of the following:

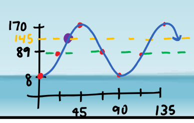
A Ferris wheel has a maximum height of 170 feet. The radius of the wheel is 81 feet. One rotation of the wheel takes 90 seconds, and the riders get on at the bottom of the wheel. $P = 90 = \frac{2\pi}{b}$

170



$y = -81\cos\frac{\pi}{45}x + 89$

When is the first time the rider reaches 145 feet?



$\boxed{33.43\text{sec}}$

4. Write an equation to model the following situation:

Low tide at Hilton Head Island, SC on July 4th occurs at 4:12 am and measures 13 feet deep. High tide occurs at 10:24 am and measures 20 feet deep. The period of the tide is 12 hours, 24 minutes.

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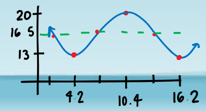
4.2

10.4

$P = 12.4 = \frac{2\pi}{b}$

$P = \frac{\pi}{6.2}$



one possibility...

$\boxed{y = -3.5\cos\left(\frac{\pi}{6.2}x - 4.2\right) + 16.5}$

5. What is the period of:

$$y = -4\cot(3x) + 1$$

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$$y = -4\underline{\cot}(3x) + 1$$

$\frac{\pi}{3}$

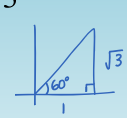
6. Solve over the given interval:

$$\cot x = \frac{\sqrt{3}}{3} \qquad \pi \le x \le \frac{3\pi}{2}$$

6. Solve over the given interval:

$$\cot x = \frac{\sqrt{3}}{3} = \frac{1}{\sqrt{3}} \qquad \pi \le x \le \frac{3\pi}{2}$$

$\cot = \frac{adj}{opp}$



$\frac{\pi}{3} \Rightarrow$ quad 3 $\Rightarrow \boxed{\frac{4\pi}{3}}$

7. Simplify the inverse trig expressions below.

$$\cos^{-1}\left(-\frac{1}{2}\right) =$$

$$\sin^{-1}\left(-\frac{1}{2}\right) =$$

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$$\cos^{-1}\left(-\frac{1}{2}\right) = \quad \text{cos} \quad \Rightarrow \frac{\pi}{3} \text{ quad 2} \Rightarrow \boxed{\frac{2\pi}{3}}$$

$$\sin^{-1}\left(-\frac{1}{2}\right) = \quad \text{sin} \quad \Rightarrow \frac{\pi}{6} \text{ quad 4} \Rightarrow \boxed{\frac{-\pi}{6}}$$

8. Simplify the inverse trig expressions below:

$$\tan^{-1}\left(-\sqrt{3}\right) =$$

$$\sec^{-1}\left(\sqrt{2}\right) =$$

8. Simplify the inverse trig expressions below:

$$\tan^{-1}\left(-\sqrt{3}\right) = \quad \text{tan} \quad = \frac{\pi}{3} \text{ quad 4} \Rightarrow \boxed{-\frac{\pi}{3}}$$

$$\sec^{-1}\left(\sqrt{2}\right) = \quad \text{sec} \quad = \boxed{\frac{\pi}{4}}$$

Chapter 5

1. Prove the Trig Identity:

$$\tan x + \cot x = \sec x \csc x$$

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$$\underbrace{\tan x + \cot x}_{} = \sec x \csc x \checkmark$$

$$\frac{\sin x}{\sin x}\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}\frac{\cos x}{\cos x}$$

$$\frac{\sin^2 x + \cos^2 x}{\sin x \cos x} = \frac{1}{\sin x \cos x} = \frac{1}{\cos x} \cdot \frac{1}{\sin x}$$

$$= \sec x \csc x \checkmark$$

2. Prove the Trig Identity:

$$\frac{\cos x}{1-\sin x} = \tan x + \sec x$$

2. Prove the Trig Identity:

$$\frac{\cos x}{\underbrace{1-\sin x}} = \tan x + \sec x \checkmark$$

$$\frac{\cos x \;(1+\sin x)}{1-\sin x \;(1+\sin x)}$$

$$\frac{\cos x\,(1+\sin x)}{1-\sin^2 x} = \frac{\cos x(1+\sin x)}{\cos^2 x} = \frac{1+\sin x}{\cos x}$$

$$= \frac{1}{\cos x} + \frac{\sin x}{\cos x} = \tan x + \sec x \checkmark$$

3. Solve the Trig equation from $[0, 2\pi)$

$$4\sin^2 x = 3$$

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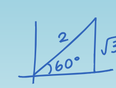
$$4\sin^2 x = 3$$

$$\sin^2 x = \frac{3}{4}$$

$$\sin x = \pm\frac{\sqrt{3}}{2}$$



$$\boxed{x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}}$$

4. Solve the Trig equation from $[0, 2\pi)$

$$\sin 2x = \sqrt{2}\cos x$$

4. Solve the Trig equation from $[0, 2\pi)$

$$\sin 2x = \sqrt{2}\cos x$$

$$\sin 2x - \sqrt{2}\cos x = 0$$

$$2\sin x\cos x - \sqrt{2}\cos x = 0$$

$$\cos x\,(2\sin x - \sqrt{2}) = 0$$

$$\cos x = 0 \qquad 2\sin x - \sqrt{2} = 0$$

$$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}} \qquad \sin x = \frac{\sqrt{2}}{2}$$

$$\boxed{x = \frac{\pi}{4}, \frac{3\pi}{4}}$$

5. Solve the Trig equation from $[0, 2\pi)$

$$2\sec^2 x - 3\sec x - 2 = 0$$

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$$2\sec^2 x - 3\sec x - 2 = 0$$

$$(2\sec x + 1)(\sec x - 2) = 0$$

$\sec x = -\frac{1}{2}$ $\qquad$ $\sec x = 2$

$x = \varnothing$ $\qquad$ $\boxed{x = \frac{\pi}{3}, \frac{2\pi}{3}}$

6. Prove the Trig identity

$$\sin 3x = 4\sin x\cos^2 x - \sin x$$

6. Prove the Trig identity

$$\sin 3x = 4\sin x\cos^2 x - \sin x \checkmark$$

$$\sin(2x + x) = \sin 2x\cos x + \cos 2x\sin x$$

$$= (2\sin x\cos x)(\cos x) + (2\cos^2 x - 1)(\sin x)$$

$$= 2\sin x\cos^2 x + 2\sin x\cos^2 x - \sin x$$

$$= 4\sin x\cos^2 x - \sin x \checkmark$$